CIRCULAR No. 147. Issued April 6, 1912.

United States Department of Agriculture,

BUREAU OF ENTOMOLOGY.

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THE ALFALFA GALL MIDGE.

(*Asphondylia miki* Wachtl.)

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INTRODUCTION.

The object in publishing a circular on the alfalfa gall midge (*Asphondylia miki* Wachtl) at the present time is to direct the attention, especially of alfalfa growers in the southwestern portion of the country, to the appearance of this foreign insect in the United States, with the hope that they will be led to observe the galled pods shown in figures 1, 2, and 3 and report the occurrence of the same to this bureau.

FIG. 1.—A head of alfalfa with all of the seed pods galled by the alfalfa gall midge (*Asphondylia miki*) except the uppermost, which is but slightly affected. Slightly enlarged. (Original.)

As a matter of fact, we do not know and can not foresee what injuries this insect will cause in this country, though it has not so far proved destructive. We do not wish to cause any undue apprehension relative to its effects, but feel that we ought to bring its presence in alfalfa fields to the attention of farmers, so that it may be carefully watched.

It has not, therefore, been thought necessary to publish here a full technical description of the midge beyond what is shown in the illustration (fig. 4).

Galls, from which this insect was afterwards reared, were first found in limited numbers by Mr. C. N. Ainslie, of this bureau, at Sacaton, Ariz., on the Pima Indian Reservation, June 12, 1909. Galls identical with these were also found in the same locality by Mr. V. L. Wildermuth, of this bureau, June 10, 1910. They were found about Tempe and Phoenix, Ariz., June 16, 1911, by Mr. E. G. Smyth, of this bureau, in about the same

numbers as previously observed by him at Sacaton, May 27, 1911. In sending a lot of heads of alfalfa from Tularosa, N. Mex., July 13, 1911, Mr. M. A. Bishop, a farmer, directed our attention to reports among his neighbors of injury to the seed and complaints of bee keepers of a lack of honey in the bloom. A considerable number of these galled pods was included in his sending, apparently without having been observed by him.

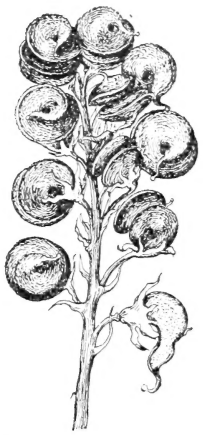

FIG. 2.—A head of alfalfa with the seed pods uninjured excepting the lower one at right, which has been attacked by the alfalfa gall midge. Slightly enlarged. (Original.)

DESCRIPTION OF THE GALL.

The following is a translation of the original description of the gall (fig. 3) found in alfalfa fields in the vicinity of Vienna, Austria:

The formation of the gall stands out as a deformation of the seed-pod of the lucerne, *Medicago sativa* L. The deformed pod does not show the same snail coil shape as in the normal, healthy condition, but it is shortened at the point, where it is somewhat shrunken. It is strongly bloated up and swelled out, particularly in the proximity of the base, the valves of the pod are considerably thicker, and the rest of it is flesh-like in color. Although the pods keep the green color on the outside, they contain no seed. It is not impossible that the insect, by visiting in large numbers fields containing lucerne, might injure the seed harvest of this clover species quite considerably.

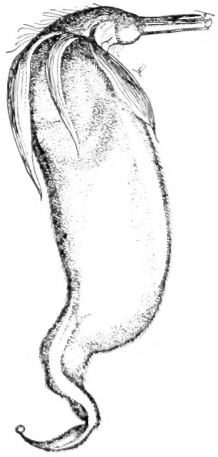

FIG. 3.—A single seed pod of alfalfa destroyed by the alfalfa gall midge. Much enlarged. (Original.)

The pupa bores through the wall of this pod with the intention of transforming to the imago. It is then situated laterally and below the shrunken gall point. On *Medicago falcata* L. I have found exactly the same gall formation, but only a few examples. Although I did not take the flies out of these galls, I do believe, nevertheless, that these galls in their formative condition agree exactly with those of the preceding species, and since one out of the same conspicuous pupal cases belongs to an Asphondylia, I dare to conclude therefrom that their origin may be traced to *Asphondylia miki*.[1] The description of the gall forms on both species of Medicago are taken from Donau-Auen of Wien.

From the galled seed pods found by him at Sacaton, Mr. Ainslie was able to rear the adult insects (fig. 4), which were later determined by the late Mr. D. W. Coquillett as *Asphondylia miki*, as

[1] G. Ritter v. Frauenfeld had already become acquainted with this gall formation for in the Verh. d. k. k. zool.-botan. Ges., Jahrg. 1861, Bd. XI, p. 173, he says: "The Gall flies inhabit the flowers of the *Medicago sativa* L. in large numbers, and the fruit of Medicago in even greater numbers." [Kaiserlich-königliche Zool.-bot. Ges. in Wien., vol. 30, p. 535, 2 tab. XVIII, fig. 2, 1880.]

described in 1880 from the vicinity of Vienna, Austria, where the species appears to affect alfalfa in precisely the same way as in Arizona and New Mexico.

THE ADULT MIDGE.

This midge belongs with a group of flies which includes the wheat midge (*Contarinia tritici* Kirby), the clover midge (*Dasyneura leguminicola* Lintn.), and the sorghum midge (*Contarinia sorghicola* Coq.). The insects are very small and obscurely colored, so that the farmer will hardly be likely to observe them. He will, however, have no difficulty in detecting the galled seed pods. During the last year or two a number of complaints have been received from the Southwest relative to the failure of alfalfa seed to develop. This has been attributed by farmers to a number of insects, none of which is at all likely to be responsible for the injury, while it is quite possible that it may be due to this gall midge.

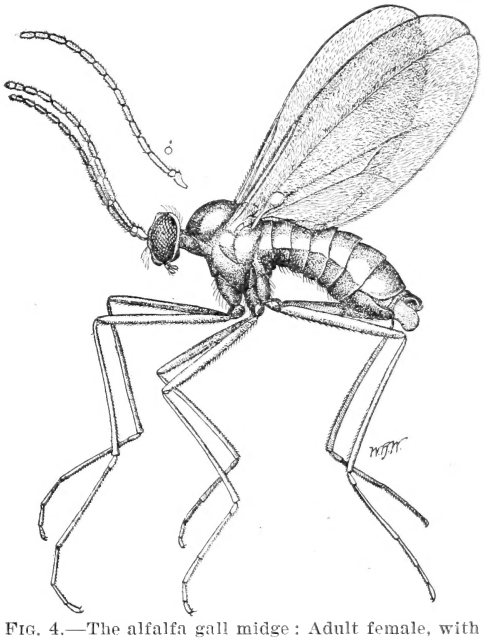

FIG. 4.—The alfalfa gall midge: Adult female, with antenna of male above, at left. Greatly enlarged. (Original.)

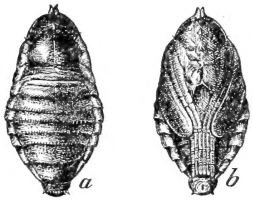

FIG. 5.—The alfalfa gall midge: *a*, Pupa, dorsal view, showing the spines on the back, by the aid of which it works itself out of the galled pod; *b*, ventral or under side of same. Greatly enlarged. (Original.)

THE PUPA.

The pupa is shown in figure 5. The dorsum, or back, is illustrated in figure 5, *a*, which shows the spines that enable it to work its way through the walls of the galled pod, as described in the preceding translation.

HABITS OF THE INSECT.

We have not, up to the present time, been able to secure very much definite information relative to the pest. From the notes made by Mr. Ainslie and also by Mr. Smyth, it would appear that the insect winters in the pods. So far as is now known its breeding season during summer is rather short, as it has not been noticed earlier than late May or later than September, excepting that Mr. Ainslie reared adults, in confinement,

as late as October 26. This late date would indicate an emergence in spring, rather than in late fall, under natural conditions.

OBSCURITY SURROUNDING ITS APPEARANCE.

That the insect should first make its appearance in the midst of a desert country (see fig. 6) is somewhat surprising. There is nothing known of it that would lead us to believe that it can be distributed in alfalfa seed. It could hardly have been imported accidentally from the Eastern Hemisphere into this part of the country. Besides this, it is preyed upon extensively by parasitic insects, which would imply a rather long residence in this country, although as these parasites are all new to science and have never been described, it would almost seem that it might be working its way from Mexico northward. The abundance of these parasites is an encouraging feature, as they tend to prevent its becoming destructive.

FIG. 6.—Map showing localities where the alfalfa gall midge has been found in the United States. (Original.)

With the additional information which we hope to obtain, both from investigations of the bureau and from those into whose hands this circular may fall, we shall probably be able to dispel much of the obscurity at present surrounding the pest. The indications are that it is spreading over the alfalfa-growing sections of the extreme Southwest, but it does not necessarily follow from this that it will prove so destructive as have many other insects coming to us from across the Atlantic Ocean.

PREVENTIVE MEASURES.

It is yet too early to say much concerning measures for preventing injury by the alfalfa gall midge. Of course, mowing the alfalfa just as the plants are coming into bloom will doubtless keep the numbers of the midge much reduced, as this method tends to prevent development, and, therefore, to curtail increase in numbers. A significant observation made at Sacaton, Ariz., May 27, 1911, by Mr. Smyth, is quite suggestive. "The galls were found very sparingly in fields which had been cut for hay less than two months since, and in such fields from none of the galls had the adults issued. But in one field of both purple and yellow flowering alfalfa, which had not been from early spring at any time cut for hay, but rather allowed to run to seed, the galls were far more plentiful than in other fields, and from a large percentage of them adults, or parasites, had issued."

Approved:

JAMES WILSON,
Secretary of Agriculture.

WASHINGTON, D. C., *January 4, 1912.*

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